

NOTES ON THE PREPARATION  
OF ROUGH SKELETONS







C. W. Gilman

STORRS L. OLSON

SMITHSONIAN INSTITUTION.  
UNITED STATES NATIONAL MUSEUM.

---

NOTES ON THE PREPARATION OF ROUGH  
SKELETONS.

BY

FREDERIC A. LUCAS,

*Assistant Curator of the Department of Comparative Anatomy.*

---

Part C of Bulletin of the United States National Museum, No. 39.

---

WASHINGTON:  
GOVERNMENT PRINTING OFFICE.

1891.



SMITHSONIAN INSTITUTION.  
UNITED STATES NATIONAL MUSEUM.

---

NOTES ON THE PREPARATION OF ROUGH  
SKELETONS.

BY

FREDERIC A. LUCAS,

*Assistant Curator of the Department of Comparative Anatomy.*

---

Part C of Bulletin of the United States National Museum, No. 39.

---

WASHINGTON:  
GOVERNMENT PRINTING OFFICE.

1891.





92  
607.9  
L82  
1871  
5002.102

## NOTES ON THE PREPARATION OF ROUGH SKELETONS.

---

BY FREDERIC A. LUCAS,

*Assistant Curator of the Department of Comparative Anatomy.*

---

These directions for preparing rough skeletons have been divided into sections, in order that the collector might turn at once to the portion bearing directly on the subject in hand. The general directions for mammals, however, apply with more or less force to all skeletons.

The extent to which these instructions can be followed will of necessity depend largely on circumstances. It is not to be expected that a collector working in the field would use the same time and care as one residing on the spot or located for some time at one place, but as one well prepared, *perfect* skeleton is worth more than half a dozen mutilated specimens, a little time spent in the work of roughing out and packing will be well repaid.

### IDENTIFICATION OF SPECIMENS.

It is, of course, extremely important to know the correct name of every skeleton, and whenever possible this should be attached to the specimen, but it is a mere waste of valuable time to endeavor to identify specimens in the field.

When the animal is unknown, its skin, roughly taken off, should be kept, or the skin of another specimen should be prepared in the usual manner, in order that it may serve as a means of identifying the skeleton.

### LABELING.

The best method is to have a series of numbers, stamped on pure sheet tin, and provided with a string for tying them to specimens, the numbers being recorded in a notebook.

Unfortunately these tin numbers are not always to be had, and a very good substitute may be made by cutting Roman numbers on a block of wood.

If labels are used let them be of good stout manilla, as thin paper is apt to be torn or defaced.

Do not use wire of any kind to fasten tin or lead numbers to specimens that are to go in alcohol or brine, for this sets up a galvanic action which results disastrously.

#### SELECTION OF SPECIMENS—FRACTURES.

Where time allows, select a series of skeletons of different ages; but where only one skeleton can be prepared, choose a fully grown, adult animal, as free as possible from fractures. If an animal is shot or trapped it is impossible to avoid breaking some bones, and such must be allowed to pass, but where it has been beaten to death, fracturing the skull and limb bones generally, the animal had better be thrown away at once.

If the skull alone is broken, select if possible another of the same size and send *both* with the body. When convenient send with a broken leg or wing another of the same size, but on no account throw away the fractured limb.

Do not neglect any animal simply because it is common, for a common species may be anatomically important.

#### TOOLS.

A knife and a pair of scissors are all that are absolutely necessary, but if these can be supplemented by one or two steel scrapers, the work will be greatly facilitated.

#### “ROUGHING OUT”—MAMMALS.

If an animal is rare, the skin should be very carefully taken off and preserved; otherwise, remove the skin roughly and disembowel the specimen, taking care not to cut into the breastbone, especially the disk-shaped piece of cartilage in which it ends. Animals destined for skeletons should *on no account* be split up the breast as though they were being dressed for market.

Detach the legs from the body and remove the flesh, taking care in so doing not to remove the collar bone or kneecap with the meat. In the cat family the collar bone is very small, and lies loose in flesh between the shoulder blade and front end of the breastbone. The collar bone of weasels is very minute and difficult to find, while, on the other hand, climbing and burrowing animals usually have this bone well developed, uniting the shoulderblade with the breastbone.

Deer, antelopes, bears, and seals have no collar bone.

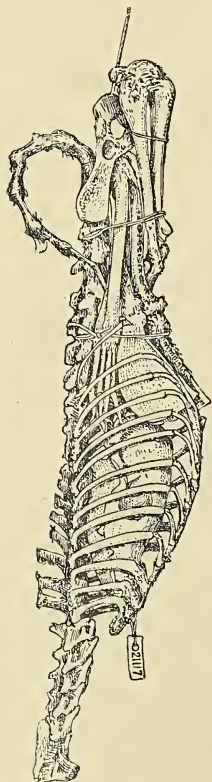


FIG. 1.—Skeleton of Fox ready for packing.

In small quadrupeds it will be unnecessary to detach the legs, but, whenever convenience in roughing out or packing renders this needful, cut the collar bone loose from the breastbone and leave it fastened to the shoulder blade.

The legs being finished, disjoint and clean the skull. Be careful in removing the eyes not to thrust the point of the knife through the thin portion of the skull back of them and in deer, antelopes, or other ruminants, take care not to break through the thin bone back of the upper teeth. Also be careful not to cut off any projections of bone.

Remove as much of the brain as possible with a scraper, bent wire, or small stick.

In cleaning the ribs take care not to cut the cartilages joining them to the breastbone, and, when the tail is reached, look for a few little bones projecting downwards from the first few vertebræ.

Fold the legs snugly along the body, or, if they have been detached, tie them together with the skull on the under side, as much as possible within the chest cavity; also turn down the tail and tie it upon itself.

Roll up in a bit of rag and fasten *securely* to one of the long bones any bones which may have been detached or any splinters from a broken bone.

Hang the skeleton to dry in the shade,\* where it will escape dogs, cats, and rats.

Lastly, in case a small skeleton is likely to be some time on the road, give it a very thin coat of arsenical soap to preserve it from the attacks of Dermestes and other insects.

On *short* collecting trips the poisoning may be omitted and the specimens treated when they reach their destination, but where small skeletons are to lie for some time uncared for, they should be poisoned, otherwise they may arrive in a very much mixed and dilapidated condition.

The breastbones of large animals should also be well poisoned.

The *best* method of poisoning small specimens is to dissolve arsenic in hot water, and when the solution is cold soak the skeletons in it for an hour or so. All the small rough skeletons stored in museum collections, as well as those in the stock of dealers in natural history material, are or should be thus treated. The addition of a little washing soda will cause water to take up much more arsenic than it otherwise would.

Should any of these small specimens be needed for disarticulated skeletons the arsenic can be extracted by soaking in a hot solution of washing soda.

---

\* In this as in many other particulars the collector will necessarily be governed by circumstances, for in moist climates, or on shipboard, it may be needful to dry specimens in the sun, or even by the aid of a fire.

## SPECIAL POINTS.

Embracing the upper part of the windpipe and connecting it with the base of the skull is a series of bones known as the hyoid apparatus. This should be carefully saved.

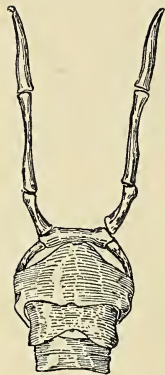


FIG. 2.—Tongue bones or hyoid of a Dog.

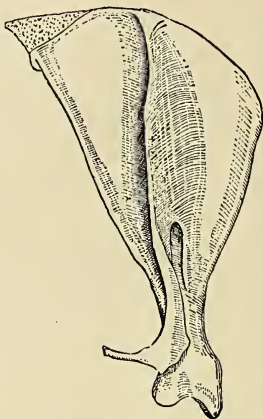


FIG. 3.—Right shoulder blade of a Rabbit, showing the backwardly projecting process.

There are usually small bones, termed sesamoids, embedded in the tendons, where they play over the under sides of the toes, and on this account the tendons should never be cut off close to the bone.

There are often one or two small bones on the back lower portion of the thigh bone; these should be left in place.

In preparing the skeletons of rabbits particular attention should be given to the shoulder blade, as this has a slender projection at the lower end, which extends some distance backward.

The male organ of a great many quadrupeds, as the raccoon, is provided with a bone. As it is difficult to say when this may or may not be present, it should always be looked for, and when found left attached to the hip bones.

## CETACEANS: PORPOISES, BLACKFISH, ETC.

Porpoise skeletons are very easily prepared, but one or two points, such as the slender cheek bones and the pelvic bones or rudimentary hind limbs, require special care.

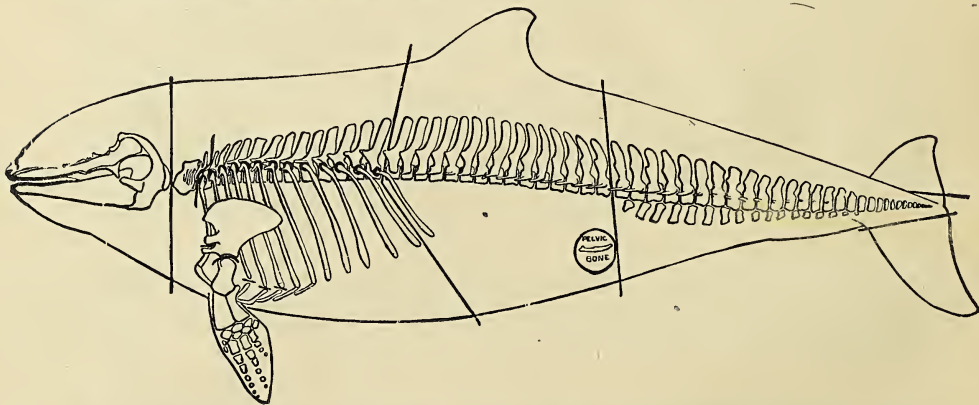


FIG. 4.—Skeleton of a Porpoise, the dotted lines showing where the cuts should be made in dividing the skeleton.

The pelvic bones are so small and so deeply imbedded in the flesh that they are only too often thrown away. The accompanying cuts show their location and their average size in a specimen 7 or 8 feet long.

It often happens that the last rib lies loose in the flesh, with its upper end several inches from the backbone. This should always be looked for.

There are no bones in the *sides* of the tail or flukes nor in the back fin, and they can be cut off close to the body and thrown away.

The hyoid is largely developed in most cetaceans, and will be found firmly attached to the base of the skull.



FIG. 5.—Full-sized pelvic bone of a Porpoise (*Turstops*).

#### BIRDS.

In preparing a bird for a skeleton a little more care must be used than is necessary with a quadruped, the bones being lighter and more easily cut or broken.

The wings terminate in very small, pointed bones, and there is a similar bone—corresponding to the thumb of mammals—hidden in a tuft of feathers on the bend of the wing.

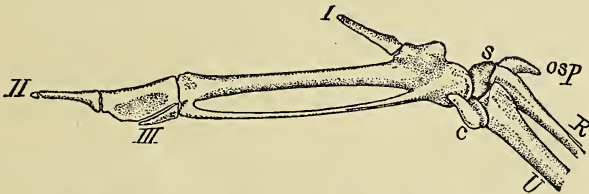


FIG. 6.—Portion of right wing of Great Horned Owl, seen from below. R, Radius; U, Ulna; I, II, III, First, second, and third fingers; s, Radiale; c, Ulnare; osp, Os prominens.

It is a good plan to leave this tuft untouched, as well as the outermost two or three wing feathers, so as to lessen the risk of removing any of these little bones with the skin.

Other parts requiring special attention are the slender points on the under side of the neck vertebrae, those projecting backward from the ribs, and the last bone of the tail.

It frequently occurs in birds that many of the tendons become ossified, as they do in the leg of a turkey. Look out for such on the under side of the neck, in the legs and wings, and along the sides of the back, and do not tear off the muscles as you would if preparing a skin.

In many, possibly most birds, the neck and back can be left untouched, as the muscles will dry up and a thin coat of arsenical soap

will serve to keep out the *Dermestes* which would otherwise attack these places.



FIG. 7.—Tongue-bones or hyoid of a Great Blue Heron.



FIG. 8.—Eye-bones, sclerotics, of a Great Blue Heron.

In many birds, and especially in birds of prey, there is a ring of bones surrounding the pupil of the eye. It is therefore best—unless you are an expert—not to remove the eyeball, but to simply puncture it to allow the escape of its fluid contents.

Remove the brain carefully.

In making the skeleton into a bundle for packing, bend the neck backward, detaching the skull if necessary, and fold the legs and wings closely alongside of the body.

#### SPECIAL POINTS.

Cormorants have a small bone attached to the back of the skull, and in Auks and many similar birds there is a small bone at the elbow.

Sometimes there is a little bone at the hinder angle of the lower jaw, so that it is a good rule not to trim up a bird's skull too closely.

The easiest, and in many ways best, way to collect small birds is to place them entire in alcohol first making an incision in the lower part of the abdomen to allow the alcohol to reach the viscera.

Alcohol should not be used of full strength (95°), the proper proportion being one-quarter water and three-quarters alcohol.

#### TURTLES.

In order to rough out a turtle it is usually necessary to remove the under shell or plastron, although some species, such as certain of the large land tortoises, can be roughed out without doing this.

In sea turtles and a few others the plastron can be cut loose by taking a little time to the operation, but in the more solidly built tortoises and

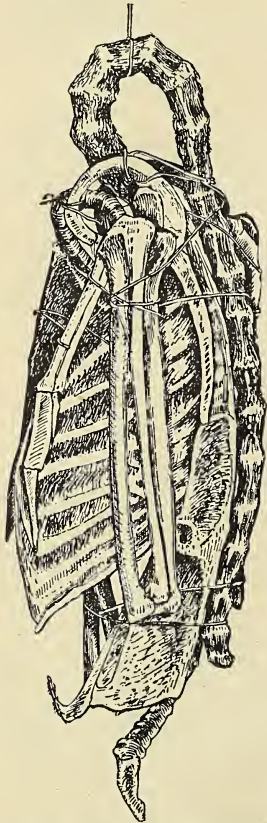


FIG. 9.—Skeleton of a bird ready for packing.

most fresh-water turtles it is necessary to saw through the bone, following the line indicated in the accompanying diagram.

The interior of the body being exposed, it is a comparatively easy matter to cut away the flesh.

Usually this can be done without disjuncting any of the legs, and it is better, especially in small specimens, to leave them attached to the body. Beware, however, of cutting into any bones, as they are frequently soft in texture and easily damaged.

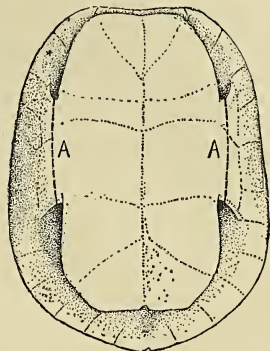


FIG. 10.—Shell of a Turtle (*Chrysemys marginata*). A A, where cuts should be made to remove the lower shell or plastron.

#### SNAKES.

Snakes require very little care in their preparation after the skin has been removed, but in the larger serpents, such as boas and pythons, rudimentary hind legs are present and should be carefully preserved.

Externally the legs appear as two little claws situated on either side of the vent; internally they are slender bones, about an inch and a half in length, loosely attached to the ribs.

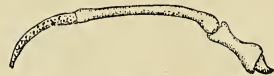


FIG. 11.—Limb of a Python (*P. molurus*), full size.

It is a comparatively easy matter to preserve both the skin and skeleton of any good-sized snake by exercising a little patience.

Do not try to skin through the mouth, but make a long cut on the under side and skin either way from it.

Coil up the skeleton and it will make a very compact bundle.

#### CROCODILES.

The breastbone of crocodiles extends the entire length of the body, and although the hinder portion of it is not attached to the backbone, yet great care is necessary in disemboweling not to cut away any of the slender bones of which it is formed.

There are also cartilaginous projections on the ribs which should not be sliced off in roughing them out.

#### FISHES.

Fishes vary so much in their structure that it is a difficult matter to give any directions for preparing their skeletons that would be of much service. Almost invariably there are two rows of ribs present, and these extend backward for some distance.

Proceed slowly and carefully, as the edge of the scalpel will often give notice of some unsuspected bone.

Be especially careful about the head. There is a chain of bones encircling the eye, and the eyeball itself is often a bony cup.

Occasionally there are two or three bones attached to the back part of the hinder portion of the head, and the patch of flesh on the cheek is about all that can safely be removed.

When the skeleton is hung up to dry place bits of wood or other material between the gills so that the air may circulate freely and dry them rapidly.

Fishes, small reptiles, and toads and frogs can be best collected by placing them in alcohol.

#### PACKING.

First be sure that a skeleton, and especially a small one, is thoroughly dry. Otherwise it is apt to "sweat" and rot the ligaments.

In the case of a large skeleton this would do no harm, but as the bones

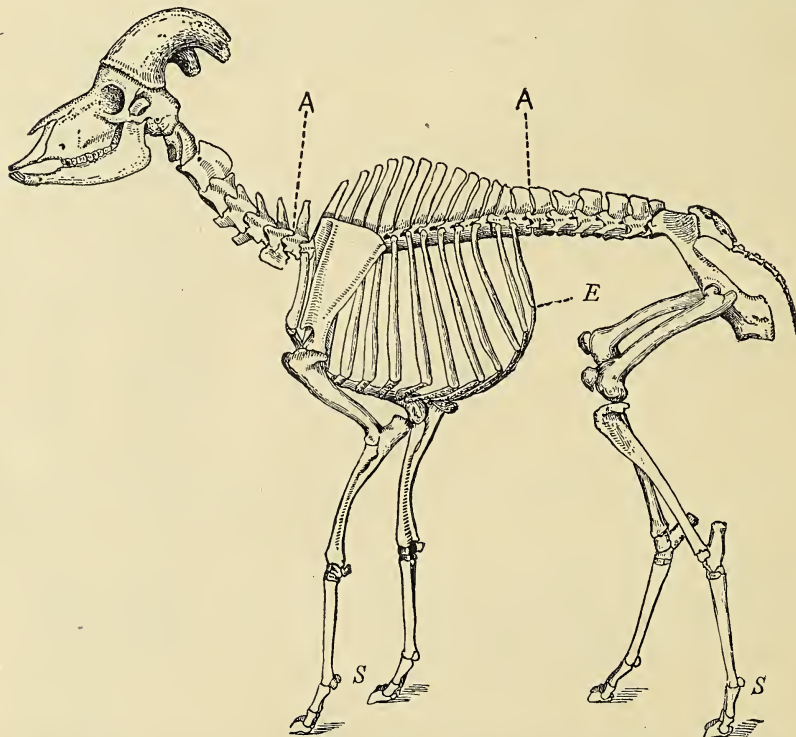


FIG. 12.—Skeleton of Mountain Sheep; AA, places where backbone may be disjoined; E, place where cut should be made to separate rib from breast-bone; S, sesamoids.

of small animals are left attached to one another by their ligaments and are not wired together, any such separation causes serious injury.

If the specimen is the size of a deer, it will be necessary to disjoint the backbone just behind the ribs in order to make a compact bundle.



A moose or buffalo can be cut up still more by separating the leg-bones at each joint and making several sections of the backbone.

Occasionally it is necessary to reduce a skeleton to its smallest possible dimensions, and then, in addition to the above measures, the breast-bone must be separated from the ribs by cutting through the cartilage *just below the end of each rib*. The ribs can then be detached from the backbone, and thus dismantled a good-sized skeleton can be packed in a flour barrel. Barrels, it may be remarked, are very useful for packing purposes.

Boxes should be tight, so as to shut out hungry dogs and prevent entirely the attacks of rats and mice. I have frequently seen valuable skeletons that were ruined in a single night by the ravages of one or two rats.

Care should also be taken not to leave boxes open over night while being packed, lest mice should make a nest in the packing material and be shut up with the specimens.

Straw or hay is the best packing material, but Spanish moss, shavings, "excelsior," or cocoa fiber will serve the purpose. Usually but little is needed, the main point being to prevent the skeletons or loose bones from rattling about.

Beware of sea weed for packing. No matter how dry it appears to be, it contains so much salt as to become wet when exposed to a moist atmosphere.

Never put alum on a skeleton, nor soak any bones in a solution containing alum.

In hot, moist climates it is occasionally allowable to sprinkle a little salt on the bones of a large animal in order to keep the flesh from putrefying instead of drying. Some aquatic animals, such as seals and porpoises, can be packed in salt without detriment to their bones, a fact that is often of great advantage when such animals are collected on shipboard, where it is often difficult or even impossible to dry large skeletons.

Small skeletons should on no account be salted, nor should large ones be boiled to remove the flesh.













